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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/604,724	06/28/2000	Tokuhisa Ohiwa	04329.2335	5467

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EXAMINER	
MALDONADO, JULIO J	
ART UNIT	PAPER NUMBER
2823	

DATE MAILED: 06/24/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/604,724	OHIWA ET AL.	
	Examiner	Art Unit	
	Julio J. Maldonado	2823	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *23 April 2003* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-5 and 21-23* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-5 and 21-23* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gotoh et al. (U.S. 5,650,041) in view of Chapman (U.S. 5,976,769) and Barker (U.S. 5,185,278).

In reference to claims 1 and 2, Gotoh et al. (Figs.2a-h) in a related method to form a patterned structure teach forming an organic film (4) on a film to be processed (2) which is formed on a semiconductor substrate (1); forming a mask layer (5) on the organic film (4); forming a resist pattern (6) on the mask layer (5); etching the mask layer (5) using the resist pattern (6) as a mask pattern; and etching the organic film (4) and the film to be processed using the mask pattern as at least a portion of the mask (column 4, line 2 – column 5, line 35).

Gotoh et al. fail to teach forming a soluble thin film which is soluble in a dissolving liquid on a film to be processed which is formed on the semiconductor substrate, wherein said soluble thin film comprises titanium nitride; and dissolving an etched soluble thin film in the dissolving liquid, thereby lifting off the mask pattern from the film to be processed. However, Chapman (Figs.9a-d) in a related method to form a pattern on a semiconductor substrate teaches forming a soluble thin film (917) on a film

to be processed (906) which is formed on the semiconductor substrate, wherein said soluble thin film (917) comprises titanium nitride or an organic layer; and dissolving an etched soluble thin film (917) in a dissolving liquid, thereby lifting off the a mask pattern (911) previously formed from the film to be processed (906) (column 6, lines 10 – 50). Therefore, it would have been obvious to combine the teachings of Gotoh et al. and Chapman to enable the formation of a soluble thin film on Gotoh et al. and furthermore to improve the removal of overlaying layers (Chapman, column 6, lines 10 – 50).

The combined teachings of Gotoh et al. and Chapman fail to teach forming the soluble film by distributing and baking a coating solution. However, Barker (Figs.1-6) in a related lift-off etching process teaches applying an organic soluble film (14) over a surface of a substrate (10), wherein said soluble thin film (14) is formed by distributing and baking a coating solution (column 2, line 61 – column 3, line 10). Therefore, it would have been obvious to one of ordinary skill in the art to combine the teachings of Gotoh et al. and Chapman with the teachings of Barker to enable the soluble film of Barker to be formed.

In reference to claims 3-5, the combined teachings of Gotoh et al., Chapman and Barker teach wherein the dissolving liquid is an alkaline solution (Chapman, column 6, lines 10 – 50); wherein the step of etching the soluble thin film and the film to be processed comprises forming a contact hole in the film to be processed (Gotoh et al., Fig.2e); and wherein the step of forming the resist pattern comprises forming a resist film with a thickness of 0.3μm on the mask layer and patterning the resist film by photolithography to form the resist pattern (Gotoh et al., column 4, lines 1 – 26).

3. Claims 21-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gotoh et al. (U.S. 5,650,041) in view of Chapman (U.S. 5,976,769), Barker (U.S. 5,185,278) and Harada et al. (U.S. 6,251,774 B1).

Gotoh et al. (Figs.2a-h) in a related method to form a patterned structure teach forming an organic film (4) on a film to be processed (2) which is formed on a semiconductor substrate (1); forming a mask layer (5) on the organic film (4); forming a resist pattern (6) on the mask layer (5); etching the mask layer (5) using the resist pattern (6) as a mask pattern; and etching the organic film (4) and the film to be processed using the mask pattern as at least a portion of the mask (column 4, line 2 – column 5, line 35).

Gotoh et al. fail to teach forming a soluble thin film which is soluble in a dissolving liquid on a film to be processed which is formed on the semiconductor substrate; and dissolving an etched soluble thin film in the dissolving liquid, thereby lifting off the mask pattern from the film to be processed. However, Chapman (Figs.9a-d) in a related method to form a pattern on a semiconductor substrate teaches forming a soluble thin film (917) on a film to be processed (906) which is formed on the semiconductor substrate; and dissolving an etched soluble thin film (917) in a dissolving liquid, thereby lifting off the a mask pattern (911) previously formed from the film to be processed (906) (column 6, lines 10 – 50), wherein the soluble thin film comprises titanium nitride or an organic film. Therefore, it would have been obvious to combine the teachings of Gotoh et al. and Chapman to enable the formation of a soluble thin film

on Gotoh et al. and furthermore to improve the removal of overlaying layers (Chapman, column 6, lines 10 – 50).

The combined teachings of Gotoh et al. and Chapman fail to teach forming the soluble film by distributing and baking a coating solution. However, Barker (Figs.1-6) in a related lift-off etching process teaches applying an organic soluble film (14) over a surface of a substrate (10), wherein said soluble thin film (14) is formed by distributing and baking a coating solution (column 2, line 61 – column 3, line 10). Therefore, it would have been obvious to one of ordinary skill in the art to combine the teachings of Gotoh et al. and Chapman with the teachings of Barker to enable the soluble film of Barker to be formed.

Gotoh et al. in combination with Chapman and Barker fail to teach forming an organic antireflection film on the mask layer before the step of forming the resist pattern; and etching the antireflection film and the mask layer using the resist pattern as a mask to form a mask pattern. However, Harada et al. (Figs.1A-F) in a related method to form a via pattern teach forming an organic antireflection film (40) on a masking layer (38) before a step of forming a resist pattern (42); and etching the antireflection film (40) and the masking layer (38) using the resist pattern (42) as a mask (column 5, lines 11 – 55). Therefore, it would have been obvious to of ordinary skill in the art at the time the invention was made to form an organic antireflection film and performing the etching steps as taught by Harada et al. in the patterning process of Gotoh et al., Chapman and Barker, since this would prevent halation during photolithography, improving dimensional accuracy (column 5, lines 49 – 55).

Response to Arguments

4. Applicant's arguments with respect to claims 1 and 21 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

5. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

6. Papers related to this application may be submitted directly to Art Unit 2823 by facsimile transmission. Papers should be faxed to Art Unit 2823 via the Art Unit 2823 Fax Center located in Crystal Plaza 4, room 3C23. The faxing of such papers must conform to the notice published in the Official Gazette, 1096 OG 30 (15 November 1989). The Art Unit 2823 Fax Center number is **(703) 305-3432**. The Art Unit 2823 Fax Center is to be used only for papers related to Art Unit 2823 applications.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to **Julio J. Maldonado** at **(703) 306-0098** and between the hours of 8:00 AM to 4:00 PM (Eastern Standard Time) Monday through Friday or by e-mail via julio.maldonado@uspto.gov. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri, can be reached on (703) 306-2794.

Any inquiry of a general nature or relating to the status of this application should be directed to the **Group 2800 Receptionist** at **(703) 308-0956**.

JMR
6/13/03

Olik Chaudhuri, SPE
for
George Fourson
Primary Examiner